

THE SOCIALIST REPUBLIC OF VIETNAM

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INDEPENDENT REPORT

**RESULTS OF FOREST AND FORESTRY LAND SURVEY AND ASSESSMENT,
AND CALCULATION OF CARBON STOCK IN ABOVE-GROUND BIOMASS
(AGB)**

**In the “Biodiversity Conservation Area of the Ngan Pho River upper watershed”
under the management of the Center of Human Ecological Study of Highland
(CHESH)**

Kon Tum, 23 July 2024

INDEPENDENT CONSULTING UNIT

PROJECT LEADER

(Signed)

DIRECTOR

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Kon Tum, 23 July 2024

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INDEPENDENT REPORT
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AND CALCULATION OF CARBON STOCK IN ABOVE-GROUND BIOMASS
(AGB)

In the “Biodiversity Conservation Area of the Ngan Pho River upper watershed”
under the management of the Center of Human Ecological Study of Highland
(CHESH)

(In accordance with the terms of reference of the Agreement on “ SMART M³ 01/ECO-ANTH/2024-2050” signed on 28 March 2024 between Center of Human Ecological Study of Highland (CHESH) and DHF Consulting One Member LLC).

I. LEGAL BASES:

Forest Law 16/2017/QH14 dated 15 November 2017 of the Vietnam National Assembly;

Circular 156/2018/NĐ-CP dated 16 November 2018 of the Government elaborating the implementation of some Articles in Forest Law;

Circular 91/2024/NĐ-CP dated 18 July 2024 of the Government amending and supplementing some Articles of Circular 156/2018/NĐ-CP dated 16 November 2018 of the Government elaborating the implementation of some Articles in Forest Law;

Decree 06/2022/NĐ-CP dated 7 January 2024 of the Government on mitigation of greenhouse gas emissions and protection of ozone layer;

Circular 31/2018/TT-BNNPTNT dated 16 November 2018 of the Ministry of Agriculture and Rural Development prescribing forest boundaries determination;

Circular 33/2018/TT-BNNPTNT dated 16 November 2018 of the Ministry of Agriculture and Rural Development prescribing forest survey, inventory, and forest transition monitoring;

Circular 16/2023/TT-BNNPTNT dated 15 December 2023 of the Ministry of Agriculture and Rural Development amending and supplementing some Articles of Circular 33/2018/TT-BNNPTNT dated 16 November 2018 of the Ministry of Agriculture and Rural Development prescribing forest survey, inventory, and forest transition monitoring;

Circular 22/2023/TT-BNNPTNT dated 15 December 2023 of the Ministry of Agriculture and Rural Development amending and supplementing some Articles of Circulars in the forestry sector;

Circular 23/2023/TT-BNNPTNT dated 15/12/2023 of the Ministry of Agriculture and Rural Development prescribing measurement, reporting and verification of results of greenhouse gas emission mitigation and greenhouse gas inventory in the forestry sector;

Decision 607/QĐ-UBND dated 3 March 2017 of the Ha Tinh Provincial People’s

Committee on adjusting the Ha Tinh's forest protection and development planning and development by 2020;

Decision 1230/QĐUB-NL3 dated 5 June 2002 of the Ha Tinh Provincial People's Committee on land allocation and forest land use rights Certificate granting to the Center of Human Ecological Study of Highland over sub-zones 70 and 71; Decision 1874/QĐ-UBND dated 9 September 2022 of the Ha Tinh Provincial People's Committee on approval of CHESH's sustainable forest management Plan.

II. OBJECTIVES AND TASKS:

- Conduct survey and assessment of the current status of forests and forestry land within the area managed by CHESH; develop current status mapping.

- Set up standard plots, measure and calculate timber volume by forest conditions.

- Develop formulas for calculating biomass stock, carbon stock in above-ground biomass (AGB).

- Cross-check, verify, and analyze data trends throughout the establishment and development of CHESH; conduct a comparative analysis of boundary overlaps and encroachments; identify root causes and propose solutions.

III. CONTENT AND METHODOLOGY:

1. Conduct survey and current status assessment, and timber volume calculation:

- Current status and actual condition: Determine condition of forests and forestry land in accordance with Circular 156/2018/NĐ-CP dated 16 November 2018 of the Government elaborating the implementation of some Articles in Forest Law and Circular 33/2018/TT-BNNPTNT dated 16 November 2018 of the Ministry of Agriculture and Rural Development (MARD) prescribing forest survey, inventory, and forest transition monitoring, which has been amended and supplemented by the MARD's Circular 16/2023/TT-BNNPTNT dated 15 December 2023.

- Determine the current status and actual condition of forest plots and forestry land across the entire implementation area.

- Area: Verify plot areas of different conditions by using GPS for measurement in combination with route-based plot demarcation.

- Stock: Conduct stock survey and verification based on measurements in standard plots that are established using typical plot method (sampling rate for standard plot establishment in accordance with the MARD's Circular No. 33/2018/TT-BNNPTNT dated 16 November 2018. Specifically, for natural forests, the standard plot area of 500m² is to be established by condition (at least 3 standard plots per condition).

- + Measure diameter at 1,3 m ($D_{1,3}$) of all trees within the standard plot (using caliper or tape measure).

- + Measure trees with DBH \geq 6cm for natural forests.

- + Determine tree names.
- + Measure clear bole height (H_{vn}): For natural forests, measure height of all trees within the standard plot.
- + Calculate $M/ha = G.H.F$ ($F=0,45$ for natural forests).
- Develop a forest and forestry land status survey and assessment map.
- Make a technical report.

2. Estimate carbon stock in above-ground biomass (AGB):

Based on the data on forest status, forest area, and timber volume from the survey, formulas for calculation of biomass stock and carbon stock in the above-ground biomass (AGB) will be developed in accordance with the MONRE's Circular No. 23/2023/TT-BNNPTNT dated 15 December 2023 on measurement, reporting and verification of results of greenhouse gas emission mitigation and greenhouse gas inventory in the forestry sector.

The calculation content of biomass stock and C-stock_AGB will be included in the technical report.

3. Cross-checking and verifying data during the biodiversity conservation and development in the forests managed by CHESH

Based on the data provided by CHESH and data collected from the provincial, district, and communal databases, an analysis will be conducted on the encroachments and overlaps of land use boundaries, and current management practices with the aim to identify the root causes and propose solutions.

The content of cross-checking and verifying data during the establishment and development of CHESH will be included in the technical report.

IV. RESULTS OF SURVEY AND ASSESSMENT OF FOREST STATUS:

1. Location:

The following forest locations are under the management of CHESH:

- Plots 2, 3, 5 of sub-zone 70 within the territory of Son Kim 1 commune, Huong Son district, Ha Tinh province;
- Plots 2, 3a of sub-zone 72 within the territory of Son Kim 2 commune, Huong Son district, Ha Tinh province.

2. Area:

A total area of 310.70 ha¹ is under the management of CHESH.

3. Status:

- Natural mountain wood forests, rich evergreen broadleaf forests (TXG): 23.76 ha.
- Natural mountain wood forests, medium evergreen broadleaf forests (TXB): 267.62 ha.

¹ Decision 1874/QĐ-UBND dated 9 September 2022 of the Ha Tinh PPC on approval of sustainable forest management Plan.

- Other area (DTK): 19.32 ha.

4. Function:

- Protection function: 179.40 ha.

- Production function: 131.30 ha.

5. Timber volume:

- Natural mountain wood forests, rich evergreen broadleaf forests (TXG): 233.06 m³/ha.

- Natural mountain wood forests, medium evergreen broadleaf forests (TXB): 149.11 m³/ha.

- Other area (DTK): None.

V. ESTIMATING CARBON STOCK IN ABOVE-GROUND BIOMASS (AGB):

1. Formulas:

Base on Circular 23/2023/TT-BNNPTNT dated 15 December 2023 of the Ministry of Agriculture and Rural Development prescribing measurement, reporting and verification of results of greenhouse gas emission mitigation and greenhouse gas inventory in the forestry sector (<https://thuvienphapluat.vn/van-ban/Tai-nguyen-Moi-truong/Thong-tu-23-2023-TT-BNNPTNT-bao-cao-ket-qua-giam-nhe-phat-thai-khi-nha-kinh-linh-vuc-lam-nghiep-593538.aspx>) to develop formulas for calculating biomass stock and C-stock _AGB as follows:

- Converting the timber volume from each forest condition to biomass:

$$\mathbf{B=M*BCEF*DW^2. Where:}$$

+ B: Biomass (ton)

+ M: Timber volume

+ BCEF: Biomass conversion and expansion factor

+ DW: Density weight

- Converting biomass stock to C-stock _AGB:

$$\mathbf{C=B*CF^3. Where:}$$

+ C: Carbon in biomass (ton C)

+ B: Biomass

+ CF: Carbon content of dry biomass (the default coefficient between carbon content and above-ground dry biomass)

2. Results:

² Circular 23/2023/TT-BNNPTNT dated 15 December 2023 of the Ministry of Agriculture and Rural Development prescribing measurement, reporting and verification of results of greenhouse gas emission mitigation and greenhouse gas inventory in the forestry sector

³ Circular 23/2023/TT-BNNPTNT dated 15 December 2023 of the Ministry of Agriculture and Rural Development prescribing measurement, reporting and verification of results of greenhouse gas emission mitigation and greenhouse gas inventory in the forestry sector

Based on the existing data of timber volume, area, and forest condition, apply the above equations to estimate the biomass stock and C-stock_AGB.

The results show that the forests managed by CHESH have the following biomass stock and C-stock_AGB:

- Natural mountain wood forests, rich evergreen broadleaf forests (TXG):

- + Area: **23.76 ha.**

- + Average timber volume per hectare: **233.06 m³/ha**; total timber volume of the entire forest: **5,537.50 m³.**

- + Average biomass stock per hectare: **117.60 tons**; total biomass stock of the entire forest: **2,794.21 tons.**

- + Average C-stock_AGB per hectare: **55.27 tons C**; total C-stock_AGB of the entire forest: **1,313.28 tons C.**

- Natural mountain wood forests, medium evergreen broadleaf forests (TXB):

- + Area: **267,62 ha.**

- + Average timber volume per hectare: **149.11 m³/ha**; total timber volume of the entire forest: **39,904,79 m³.**

- + Average biomass stock per hectare: **75.24 tons**; total biomass stock of the entire forest: **20,135.96 tons.**

- + Average C-stock_AGB per hectare: **35.36 tons C**; total C-stock_AGB of the entire forest: **9,463.90 tons C.**

VI. ANALYSIS OF BOUNDARY AND STATUS CHANGES OF CHESH'S FORESTS OVER TIME

1. Discrepancy in the forest owner's boundaries:

- According to the land use rights Certificate issued in 2002, the boundaries of land allocated to CHESH is encroached by the Ngan Pho River Protection Forest Management Board in the area adjacent to the Huyen Vi spiritual zone.

*** Reasons:**

- There was no consistent coordination between the previous forest owner (CHESH) and the subsequent forest owner (the Ngan Pho River Protection Forest Management Board) during the process of state management agency handing over the management boundary to the subsequent forest owner (the Ngan Pho River Protection Forest Management Board).

- When handing over the boundaries and updating data, there was a lack of consistency and thorough field verification between the state management agencies and stakeholders to update data on the digital system.

2. Discrepancy in area:

a. Discrepancy between the actual managed area and the area stated in the land use rights Certificate issued in 2002:

- The actual area currently managed by CHESH is 328.5 ha.
- The area stated in the land use rights Certificate issued and granted to CHESH in 2002 is 285.4 ha.

*** Reasons:**

- The measurement technology used in 2002 for the land use rights Certificate issuance was outdated.
- The coordinate reference system used in 2002 for the land use rights Certificate issuance was not as accurate as it is today.

b. Discrepancy between the actual managed area and the area stated in the approved sustainable forest management Plan under Decision 1874/QĐ-UBND dated 9 September 2022

- Actual area managed by CHESH is 328.5 ha
- Area stated in the CHESH's sustainable forest management Plan approved in 2022 is 310.70 ha.

*** Reasons:**

- When developing the sustainable forest management Plan, the implementing unit failed to undertake re-measurements and thorough reviews, but only relied on the government-provided data.
- The sustainable forest management Plan only indicates the area designated for three forest planning functional categories. As a result, the implementing unit did not include the forest area outside these three categories (which in reality includes unplanned natural forests and functional zoning systems) in the plan.

3. Discrepancy between the actual managed locations and the locations stated in the land use rights Certificate 1230 issued on 5 June 2002:

- The actual locations managed by CHESH include sub-zone 70 in Son Kim 1 commune and sub-zone 72 in Son Kim 2 commune of Huong Son district, Ha Tinh province.
- The locations stated in the land use rights Certificate 1230 issued in 2002 include sub-zones 70 and 72 in Son Kim commune of Huong Son district, Ha Tinh province.

*** Reasons:**

- Due to the government's policy of splitting Son Kim commune into two separate communes of Son Kim 1 and Son Kim 2, sub-zones 70 and 72 no longer belonged to one single commune of Son Kim as of the date the land use rights Certificate was issued, but they are now part of both Son Kim 1 and Son Kim 2 communes. Accordingly, CHESH has not yet updated this change in the land use rights Certificate 1230 issued on 5 June 2002.

4. Independent Consulting Unit's assessments and recommendations

a. Assessments:

After conducting survey and assessment of the actual situation, as well as collecting documents and legal documents from CHESH and data sources from the state management agencies, the consulting unit has identified that the above-mentioned discrepancies are caused by both subjective and objective reasons:

- Subjective reasons:

+ There has been a lack of coordination among state management agencies in the process of handing over boundaries to the subsequent forest owner (the Ngan Pho River Protection Forest Management Board), resulting in the boundary overlaps between the two forest owners.

+ When developing the sustainable forest management Plan, the implementing unit did not conduct the thorough field surveys both before and after the plan development; CHESH did not coordinate with the implementing unit to survey, compare, and verify the field data before incorporating it into the final plan mapping; the implementing unit only used the state management data to develop the plan, leading to the exclusion of some areas outside the three forest categories (which in reality include unplanned natural forests and functional zoning systems) from the sustainable forest management Plan.

- Objective reasons:

+ The technology and equipment used in 2022 for measurement and land use rights Certificate issuance was outdated.

+ The coordinate reference system used in 2002 for measurement and land use rights Certificate issuance was not as accurate as it is today.

b. Recommendations:

Given the identified inadequacies, the consulting unit recommends that CHESH should proactively work with the relevant state management agencies to conduct on-site surveys and reviews, and cross-check the changes in terms of area, encroachments and overlaps regarding: 1) Land use rights Certificate 1230/5/6/2002⁴, 2) sustainable forest management Plan which has been approved under the Decision 1874/QĐ-UBND dated 9 September 2022⁵, and 3) the actual area managed by CHESH, to ensure the alignment and consistency of all relevant legal documents and records, thereby enhancing the accuracy and transparency of all issued documents.

Ha Tinh, 23 July 2024

INDEPENDENT CONSULTING UNIT

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⁴ The area stated in the land use rights Certificate issued in 2002 is 285.4 ha

⁵ The area stated in the sustainable forest management Plan approved in 2022 is 310.70 ha.